DOCUMENT RESUME

ED 123 106 SE 020 809

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TITLE A Model for Science Curriculum Implementation: Iowa-ASSIST.
PUB DATE Apr 76
NOTE 21p.; Paper presented at the Annual Meeting of the National Association for Research in Science Teaching (49th, San Francisco, California, April 23-25, 1976); Marginal legibility in figures

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage
DESCRIPTORS *Curriculum Development; Elementary Secondary Education; Instructional Improvement; *Science Curriculum; Science Education; *Science Programs
IDENTIFIERS Iowa; National Science Foundation; NSF; Project ASSIST

ABSTRACT

A project is described wherein the major activity is assistance to schools for implementing or revising science curriculum programs in Iowa schools. Programs emphasized include all grade levels. Assistance is provided in the areas of mathematics and social studies as well as science. A K-12 Environmental Studies Program was developed by the project personnel as well. The teams for each program are described in relation to what members are included, what activities are pursued, and what followup programs were expected. The rationale of the project is presented as well as an outline of the major concepts and service possibilities. The model consists of five levels: (1) the Coordinating Staff; (2) the Consulting-Advisory Groups; (3) Research and Development; (4) Programs--Teacher Education, Student, Community Related; and (5) Regional Centers. Flow Charts, workshops offered, national curriculum program used, and type and number of education programs offered for teachers are presented. (EB)

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A Model for Science Curriculum Implementation:

Iowa-ASSIST

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SE 020 809

A Model for Science Curriculum Implementation: Iowa-ASSIST

Iowa-ASSIST is a program for assisting schools and communities with improvement of science teaching and science offerings. ASSIST is an acronym for Alternative Strategies and Services for Improving Science Teaching. The program is an integral part of the Science Education Center and represents a major effort with in-service education in Iowa. The program began in 1972 with plans and discussions with persons throughout the State. The program was initiated during 1973-74 as a part of a Leadership Development Project funded by the National Science Foundation. The 1974-75 academic year was the first year for direct support of Iowa-ASSIST with support from the Instructional Improvement Implementation Section of the National Science Foundation.

Basis to Iowa-ASSIST has been the establishment of sixteen regional service centers throughout the State. A regional coordinator, often a science consultant for the newly created Area Educational Agencies, has been identified and acts in each region to initiate and carry out a variety of improvement efforts. Such coordinators have developed communication networks with all schools (administrators and science teachers) in their geographical areas. In general the ASSIST regions respect the same boundaries as those of the Area Educational Agencies. Figure 1 illustrates the geographical service areas in the State.

The major activity of Iowa-ASSIST is the assistance provided to schools for directly implementing or revising major science curriculum programs in Iowa schools. Initially the program has provided more assistance with implementing science programs in elementary schools than in secondary schools. Major programs which have been emphasized include ESS, SCIS, SAPA, USMES, MAPS, and Science 5/13. Secondary programs in which assistance has been provided include ISCS, IPS, TPE, IAC, and ISIS. Assistance has been provided in the areas of mathematics and social studies as well. In addition, a K-12 Environmental Studies Program developed by Project ASSIST personnel has proven to be a desirable supplement

Project ASSIST Regions with Regional Centers (x)

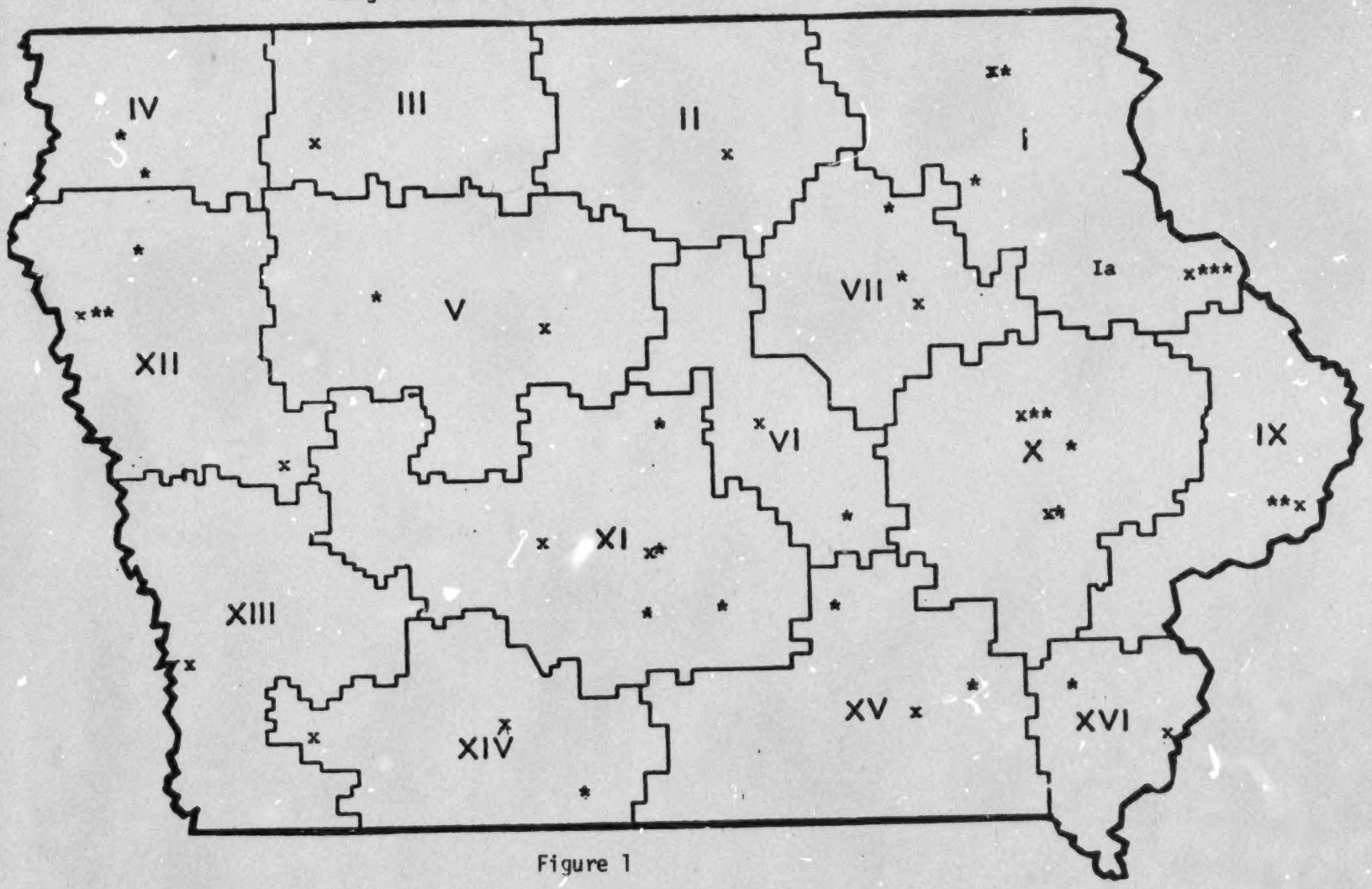

Figure 1

Region I - Decorah
Region Ia - Dubuque
Region II - Mason City
Region III - Emmetsburg
Region IV - Sheldon
Region V - Fort Dodge
Region VI - Marshalltown
Region VII - Waterloo
Region IX - Davenport
Region X - Cedar Rapids
Region XI - Des Moines
Region XIa - Perry
Region XII - Sioux City
Region XIII - Council Bluffs
Region XIV - Red Oak
Region XV - Ottumwa
Region XVI - Burlington

*-Institutions of Higher Learning
x-Headquarters for Regional Coordinators

to existing courses and programs.

Staff teams for each curriculum program are formulated. Each of these teams is headed by a professor from the University of Iowa and includes local supervisors, key teachers, curriculum representatives, and professors from other colleges and universities (who are formally named University Lecturers).

Typically the progression of activity starts with an Awareness Conference (usually for administrators and key teachers). Following such conferences, meetings with local teacher groups, community leaders, and central administrators are held as a decision to adopt a given program is made. After such a decision teachers are invited to participate in a special in-service instructional program. Such a program includes a summer introductory workshop (usually two or three weeks in length) which is held at the regional center. Such workshops are designed to provide an introduction to the content, the organization, and the teaching strategies which characterize a given program. Following the summer workshop, a series of in-service meetings (usually six sessions each scheduled for a duration of three hours for each semester) are planned. In addition, school intervisitations, staff visits, and meetings in individual schools all represent informal instructional strategies. The use of the new materials in classrooms with students is central to the academic year phase. Such classrooms represent the "laboratory" for the course(s). Typically each teacher participant earns six semester hours of credit for the summer and the academic year sequence. In some instances the academic year program can be waived if the implementation effort does not require it.

Three activities which characterize Iowa-ASSIST occur and operate from the Science Education Center. First is the general administration of the program, including course outlines, assigning credit, staffing each program at each center, and communication from center to center and program to program. A second activity

is program evaluation. This includes assistance with needs assessment prior to or concurrent with awareness activities. The primary objective, however, is to evaluate the effectiveness of the implementation effort in terms of successful and continuing use of the new materials in given schools. The third central activity is the operation of a Resource Center. This Center includes sample materials for each new program for hands-on experience at the Science Education Center or in the field. It also includes the development and distribution of new materials which can be used to supplement and enrich the regular program materials. A Materials Center also provides a source for laboratory materials and other expendable supplies needed for each of the programs. Orders can be filled quickly and inexpensively. Many times such materials can be delivered directly to the school.

The Iowa-ASSIST staff includes a director who is the Coordinator of Science Education at The University of Iowa. It also includes a Coordinator of Field Activities, a Coordinator of Instruction and Evaluation, and a Coordinator of the Resource and Materials Centers. Affiliated staff includes Director of Student Programs and the Director of Iowa-UPSTEP. Other University of Iowa staff include the six to ten University Professors who act as team leaders for the major curriculum programs for a given year.

Two related programs at the Science Education Center are coordinated with the Iowa-ASSIST in-service effort. These are the Student Program effort and the model pre-service teacher education program called Iowa-UPSTEP. The Student Program effort involves special enrichment programs and activities for highly motivated secondary school students, especially during summers. A variety of activities during the academic year provides full scale effort with high ability youths in Iowa schools. The Student Program relies heavily upon in-service teachers for recruiting and involving students as well as assisting with the

instructional program. Iowa-UPSTEP is a model four-year preparatory program for new science teachers which enjoyed support from the National Science Foundation for a five-year developmental period. Iowa-UPSTEP includes many features in which in-service teachers are involved. One of the most important of these is the assistance provided for revising local curricula. Often teachers involved with this effort have the benefit of special funding by the local school districts by means of an extended contract.

Figure 2 is an attempt to describe the ASSIST Model diagramatically. The Model consists of five levels, the Coordinating Staff, the Consulting-Advisory Groups, Research and Development, Programs--Teacher Education, Student, Community Related, and the Regional Centers. The level relationship is designed to indicate a flow of information, ideas, and needs from the regions into the coordinating staff, who acting upon the suggestions of the consulting-advisory group, direct the regional information to the research and development team. The research and development group assesses, plans, directs implementation, supplies soft and hardware curriculum materials, and evaluates the regional-designed-program. At any point in time regions can select the designed on-going programs indicated at the fourth level.

Following is a list describing the specific make-up and responsibilities for each level of the Model: 1) Project Coordinator and Coordinating Staff -- This group will function principally at the University of Iowa. The Project ASSIST Center staff responding to the requests and needs of the regions will make available consultants, curriculum materials and the services of the center. A channel of communication will be established at the center for dissemination of Project ASSIST information and of Science Education news at the state and national level; 2) Consulting-Advisory Groups -- The members make information of their particular expertise available to the Executive Committee and to the Program areas; 3) Research and Development -- The team assesses the stated needs of each region, plans, prepares

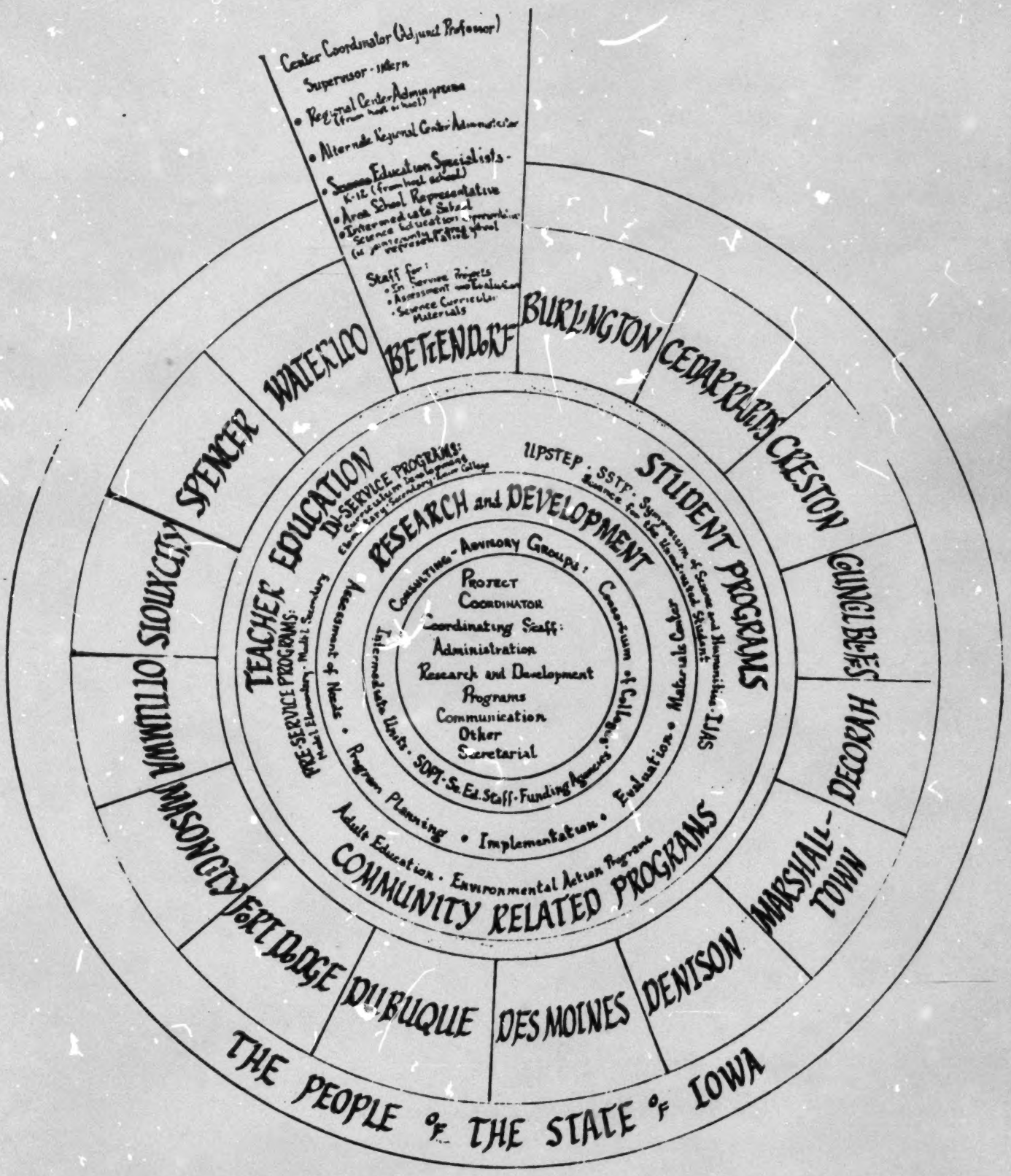

Figure 2

Iowa-ASSIST Model

implementation instruments, and evaluates regional designed programs while maintaining constant evaluation and reassessment of on-going programs in science education throughout the state; 4) Programs--Teacher Education, Student, and Community Related -- The programs, directed in the areas of pre- and in-service teacher education, students-academically oriented and less motivated, and community related, including adult education and local environmental students, are intended to be on-going programs throughout the State. Each region will design programs or modify existing programs to meet their particular needs; 5) Regional Centers -- The centers of science education in the state of Iowa are the dynamic satellites of the total Project where the needs in education within a given geographic boundary (Iowa) are continually being identified and actively given a response.

Many agencies, institutions, and groups are concerned with educational improvement. Figure 3 presents a model which is central to Iowa-ASSIST. It illustrates how various groups interact and cooperate to accomplish various aspects of science education improvement efforts.

The major concepts and service possibilities characterizing Iowa-ASSIST, a model for science curriculum implementation, include the following:

1. Coordination of Effort. Rather than to continue the operation of a number of isolated science education programs by various institutions throughout the state, Iowa-ASSIST has established a consortium for the purpose of restructuring our approach to a common problem. Preliminary discussions regarding this matter have indicated that the major teacher education programs within the state share: a) common concern for and awareness of the need for more effective means of improving science education programs, and b) a willingness to coordinate individual efforts into a more unified focus. The increased communication and manpower that stems from much cooperation makes possible a much more dynamic and effective science program for the schools of Iowa.

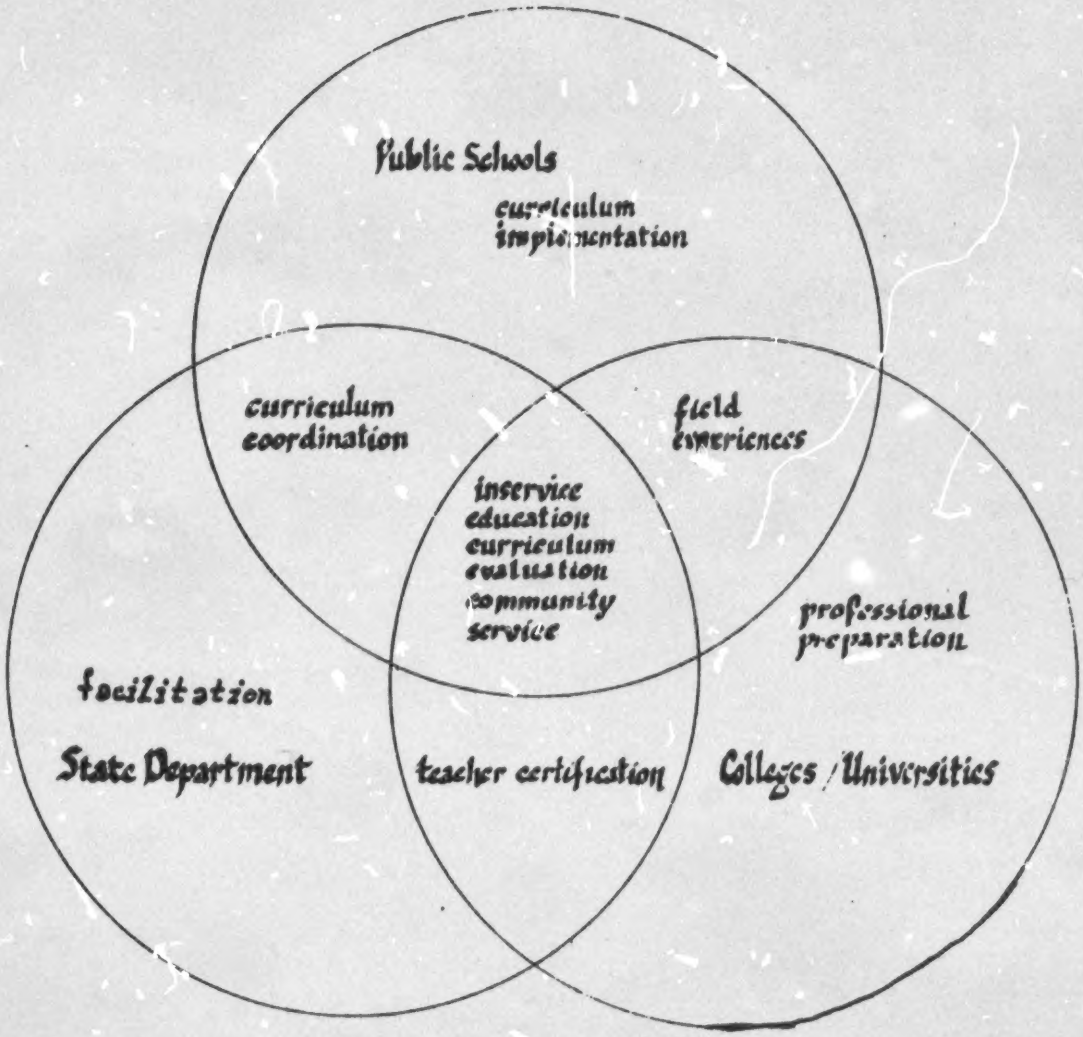

Figure 3

Areas of Responsibility for Improvement of Science Teaching

2. Regional Involvement. That persons closely involved with students and classroom activities should play a major role in the development of any new approach to a more effective science program in a basic premise of Iowa-ASSIST. Several regional centers at various points in the state have been identified. These serve as meeting places where persons from institutions of higher learning and from local schools meet to plan for the future. All planning is done in the respective regional centers thereby insuring a closer congruence between program development and the critical needs of the schools within a specific region.

3. Cooperative Effort. Both institutions of higher learning through government funding and local schools through their regular instructional and curriculum development budgets cooperate financially and professionally in the planning and implementation of new programs or the restructuring of those now in existence. This cooperation includes the following phases of development:

A. Educational Needs Assessment teams comprised of local school representatives and university evaluation specialists cooperate in conducting a thorough, professional assessment of the critical education needs within given geographic regions. These, together with an assessment of the physical and financial limitations within which specific schools must operate, serve as the basis for 1) determining program objectives, 2) evaluating the effectiveness of existing programs, and 3) proposing curricular changes.

B. Curriculum and Program Development. With the help of university consultant services and in-service programs housed at respective regional centers, the selection, adaptation, or development of curricula follow. This incorporates the recommendation of the Needs Assessment team in order to provide a program suitable to the specific school for which it is designed.

The establishment of the regional center as a curriculum development center has the advantage of providing close at hand consulting services from a

consortium member, together with teacher education programs to assist the implementation of selected curricula.

4. Self Sustaining Program Development. Moreover the regional center functions to provide continuous reassessment, replanning, and consultative services over the years which ensures continuously viable and up-to-date science programs. Once government funds have been withdrawn, the efforts they have made possible continues as a normal part of the operating budgets of both consortium institutions and local schools. Here the centers provide invaluable sources of data for researchers and opportunities for pre-service internships, and a continuing close-working alliance between universities and schools, thereby enabling local schools to reap a much fuller benefit from their university resources in terms of continued consultation and in-service education.

5. Instructional Materials Center. Included in the preliminary concept of Project ASSIST is the establishment of an instructional materials center at the University of Iowa. Here, those materials determined essential for program implementation are assembled or manufactured and disseminated at the lowest possible costs. Since the materials center works in response to the needs of Iowa schools as reported by assessment teams, an efficient, cost effective system of material supply is developed for the maximum benefit to participating schools.

The process of selecting and operating programs is the distinguishing feature of the Iowa-ASSIST model. The process, utilizing a closely defined problem-solving technique, centers on planning and evaluation as essential channels through which programs are developed. Highlights of the process include:

(1) measuring and assessing education needs of the regional districts;

(2) identifying and priority ranking of deficiencies;

(3) setting minimum acceptable standards for solutions;

(4) specifying desired outcomes;

(5) searching for alternative methods to achieve desired outcomes;

(6) choosing the most promising acceptable methods;

(7) organizing and implementing programs; and

(8) evaluating results of new program.

In the final analysis, the worth of Project ASSIST rests upon its capacity to affect the quality of life throughout the regional area. To accomplish this, Iowa-ASSIST must deliver cost-effective programs and services utilizing local and external resources while serving as a model of administrative practices. This new alignment of resources provides a setting for planning new educational programs and supporting new teaching technologies.

Iowa-ASSIST forges a setting in which practicing administrators, by means of an active and protracted involvement with the processes of the regional concept, are encouraged to adopt a new and demanding role: responding to educational problems with the force and direction that sound planning and evaluating strategies afford. And this means approaching old problems with new solutions as well as encountering new problems with a new and forceful perspective.

Iowa-ASSIST is people--local school systems, institutions of higher education, and state departments of education--working together within a particularized organizational structure and utilizing a closely defined problem-solving process in order to improve the quality of education regionally.

Outcomes After Four Years. Tables 1, 2, 3, and 4 provide specific data concerning implementation of national curriculum in Iowa schools as a result of the Iowa-ASSIST program. It is at once apparent that the program has had enormous impact in terms of the in-service assistance it has afforded. Significant increases in the use of the newer programs has resulted because of the Iowa-ASSIST program operating in the State during the past four years.

Table 1

WORKSHOPS OFFERED AS PART OF IOWA ASSIST

Curriculum	Total Number of Workshops	Number of Participants
Elementary Science Study (ESS)	19	452
Science: A Process Approach (SAPA)	7	182
Science Curriculum Improvement Study (SCIS)	12	302
Environmental Studies/Outdoor Biology Instructional Strategies (ES/OBIS)	16	387
Unified Science and Mathematics for Elementary Schools (USMES)	1	13
Developing Mathematical Processes (DMP)	1	24
Intermediate Science Curriculum Study (ISCS)	4	70
Introductory Physical Science (IPS)	2	35
Technology-People-Environment (TPE)	8	120
Subtotal	60	1,585
Awareness Conferences		
(Two week / Administrators)	3	135
(Two week / Teachers)	2	60
(One day / Administrators & Teachers)	62	1,350
TOTAL	127	3,130

Table 2

IOWA-ASSIST WORKSHOP LOCATIONS

CENTER	ESS	SAPA	SCIS	ES/OBIS	USMES	DMP	ISCS	IPS	TPE	Total Workshops At Each Center
Calmar			1	2						3
Mason City			2	1			2			5
Estherville	1				1					2
Ft. Dodge	1		1	1				1	2	6
Marshalltown	1	1	1	2						5
Waterloo				1						1
Dubuque	1		3	1						5
Davenport	3		1					1	2	7
Cedar Rapids	3		1	1		1			1	7
Des Moines		1	1	1			1			4
Sioux City	2			1					1	4
Council Bluffs		2		2						4
Creston	1								1	2
Ottumwa	1			1			1			3
Burlington		1	1	2						4

Curriculum Key:

ESS - Elementary Science Study
SAPA - Science: A Process Approach
SCIS - Science Curriculum Improvement Study
ES/OBIS - Environmental Studies/ Outdoor Biology Instructional Strategies
USMES - Unified Science and Mathematics for Elementary Schools
DMP - Developing Mathematical Processes
ISCS - Intermediate Science Curriculum Study
IPS - Introductory Physical Science
TPE - Technology-People-Environment

Table 3

Four Years of Selected Curriculum Implementation in Iowa

Curriculum	1972-73			1973-74			1974-75			1975-76		
	Schools	Teachers	Students	Schools	Teachers	Students	Schools	Teachers	Students	Schools	Teachers	Students
SCIS	4	63	1,386	38	308	8,045	83	388	11,640	94	420	11,890
ESS	5	94	1,974	50	344	9,563	73	394	10,976	81	467	13,076
SAPA	3	43	1,075	38	272	8,266	52	300	9,300	65	334	9,352
ES/OBIS	0	0	0	3	5	260	83	195	6,240	148	326	9,780

Curriculum Key:

SCIS - Science Curriculum Improvement Study
ESS - Elementary Science Study
SAPA - Science: A Process Approach
ES/OBIS - Environmental Studies/Outdoor Biology Instructional Strategies

Table 4

Percentage of Schools Using Selected Programs in Iowa

Curriculum	1972-73	1973-74	1974-75	1975-76
SCIS	0.9	8.4	18.2	20.6
ESS	1	11	16	17.8
SAPA	0.6	8.4	11.4	14.3
ES/OBIS	0	0.6	18.2	32.5

Curriculum Key:

SCIS - Science Curriculum Improvement Study
ESS - Elementary Science Study
SAPA - Science: A Process Approach
ES/OBIS - Environmental Studies/Outdoor Biology Instructional Strategies

Relative efficiency of the ASSIST model in comparison with other National Science Foundation programs is of interest. Table 5 represents a comparison of such programs centered at the University of Iowa during the past fifteen years. It is apparent that the ASSIST model is relatively inexpensive and has affected large numbers of teachers and schools in a relatively brief span of time.

An important component of Iowa-ASSIST is the assessment and evaluation effort. Specific reports concerning these studies have been reported elsewhere. [1,2] In general, significant content achievement has been measured in students in each workshop concerned with each curriculum program. Analysis of audio-tapes has revealed that students have developed significantly in terms of their ability to practice inquiry skills. Participants have grown significantly in terms of their perceptions of the nature of specific curricula and the approaches recommended. Measurements have illustrated significant changes in affective areas as well. There is considerable evidence that the Iowa-ASSIST program has been successful in changing teachers, their perceptions, their approaches to teaching science, and their knowledge.

Another publication has been released which describes operational policies and specific procedures characterizing Iowa-ASSIST.[3] A comprehensive special report has also been prepared outlining the evolution of the model, reporting staff involved and teachers affected, and persenting the general budget associated with the program.

Iowa-ASSIST is a model program with demonstrated effectiveness. Such implementation programs have been formulated in other states and regions. Many have collected similar data concerning the impact of such federal support for curriculum implementation. Certainly there are needs for continued support

Table 5

Comparison of Efficiency of Foundation Education Programs

Science Education Center

The University of Iowa

TYPE OF PROGRAM	YEAR(S)	NUMBER OF TEACHERS	TOTAL AMOUNT OF GRANT	TOTAL COST/WEEK/ PARTICIPANT
ISI	1961 - 1973	795	$ 254,229	$ 80
CCSS	1970 - 1972	88	$ 83,255	$105
SI	1961 - 1973	793	$1,091,356	$172
AYI	1969 - 1973	42	$ 288,650	$172
LDP (1)*	1973 - 1974	16 (leaders only)	$ 172,004	$239
(2)**	1973 - 1974	(225)	($ 172,004)	($ 25)
III***	1974 - 1975	816	$ 201,693	$ 31
	1975 - 1976	860	$ 201,693	$ 29

* Computed on basis of 45 weeks full time instruction during 1974-75 only
** Computed on basis of 3 weeks full time instruction
*** Computed on basis of 3 weeks full time instruction during summer and 5 weeks full time instruction during academic year

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NSF Program Code:

ISI - In-Service Institutes
CCSS - Cooperative College-School Science Programs
SI - Summer Institutes
AYI - Academic Year Institutes
LDP - Leadership Development Project
III - Instructional Improvement Implementation Programs

for the development of curriculum materials, for information about learning patterns, for national evaluation efforts. Nonetheless, the needs for continued support for assistance with implementation strategies and in-service education in general remain critical. As we consider future directions while momentarily pausing at the funding crossroad, support for in-service teacher education and curriculum implementation is vital. Indeed, without support for implementation, the other aspects of funding in-service education cannot approach their potential and needed impact.

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